

## ILLUSTRATED WEED FLORA OF COTTON CROP OF KHAIRPUR DISTRICT, SINDH, PAKISTAN

RABIA ASMA MEMON<sup>1\*</sup>, G. RAZA BHATTI<sup>2</sup>, SHAHIDA KHALID<sup>3</sup> AND SHAKEEL AHMED<sup>2</sup>

<sup>1</sup>Institute of Plant Sciences, University of Sindh, Jamshoro, Pakistan

<sup>2</sup>Shah Latif University Botanical Garden & Herbarium, Pakistan

<sup>3</sup>Weed Science, National Agriculture Research centre, Islamabad, Pakistan

\*Corresponding author's e-mail: rabiאים@hotmail.com, rasmamemon@gmail.com

### Abstract

A survey was carried out for the composition of weed flora of cotton crop of Khairpur district, Sindh, Pakistan. Thirty-six weed species belonging to 16 families were noted. Poaceae was found to be most dominant family representing seven species followed by Asteraceae and Papilionaceae, each with five species. Botanical descriptions and illustrations/line drawings of all the recorded taxa were prepared in order to identify the weed species.

### Introduction

Cotton (*Gossypium hirsutum* L.) occupies a significant role in the economy of Pakistan. Besides other reasons its yield is also reduced by heavy weed infestation. Weeds also decrease the availability of water, nutrients and light to crop plants. According to Tunio (2000) the cotton crop in Pakistan suffers 31-41% loss due to occurrence of weeds and decreasing its yield and market value.

In order to develop any weed management program and to learn more about their ecological aspects, the key factor is correct determination of such plants. The best way is proper studies on flora of weeds. For the identification of plant species scientific/botanical illustrations are equally important in addition to taxonomic descriptions. By depicting the plant species with accurate features scientific illustrations help them to recognize and differentiate from other species.

A lot of studies are reported to compile the list of important weeds of cotton from various areas of Pakistan (Hussain, 1987; Brohi & Makhdoom, 1987; Ullah *et al.*, 1995; Memon *et al.*, 2001 and Rajput *et al.*, 2008).

Memon *et al.*, (2007) did survey on the diversity of weed species and determined their density, frequency (Table 1) in addition to similarity index and family importance values.

Present paper provides the checklist of fully identified weeds of the study area. Botanical illustrations are made which will be helpful in identifying the problematic weeds.

### Materials and Methods

All the recorded weed species were collected at the time of flowering and seed maturation. The collected specimens were then pressed and mounted on herbarium sheets and deposited in Shah Latif University Botanical Garden & Herbarium (SLUBGH), Khairpur, Pakistan. All

the recorded weed species were identified taxonomically with the help of Flora of Pakistan (Ali & Nasir and Ali & Qaiser, 1970-2003 Eds.); Flora of Karachi (Jafri, 1966); Flora of Bombay (Cooke, 1903-1906); crop weeds of Nepal (Rajbhandari & Joshi, 1998); Flora of Egypt (Boulos, 1999) and Flora of Tamilnadu Carnatic (Matthew, 1982-83). Line drawings/illustrations of each taxa were made depicting their habit and diverse parts.

### Results and Discussion

All the species recorded from study area belonged to 16 families including 14 dicotyledons and 2 monocotyledons. The checklist of recorded species, arranged alphabetically into their respective genera and families is provided below. Illustrations and short descriptions of each species along with dichotomous keys are provided in this paper for quick identification.

#### Dicotyledons

##### Aizoaceae

*Trianthema portulacastrum* L., Sp. Pl. 223. 1753. Fig. 1A. Annual, up to 70 cm long. Stem sparsely pubescent.

*Amaranthus viridis* L., Sp. Pl. ed. 2, 1405 (1762). Fig. 1B. Annual much branched herb, up to ca. 60 cm tall.

*Celosia argentea* Linn., Sp. Pl. ed. 1: 205. 1753. Fig. 1C. Annual herb, erect, up to ca. 4 ft. high, simple or with many ascending branches.

*Digeria muricata* (L.) Mart. In Nov. Act. Acad. Caes. Leop.- Carol. 13(1): 285 (1826). Fig. 1D.

An annual herb up to 60 cm tall, erect, branched, glabrous or sparingly hairy, ridged.

#### Amaranthaceae

1. Flowers unisexual ..... (1) *Amaranthus*
- 1\* Flowers bisexual.
2. Stigma simple or 2 or 3, subulate.  
Fruit a circumscissile dehiscent capsule ..... (2) *Celosia*
- 2\* Stigma 2, recurved. Fruit a crustaceous nut ..... (3) *Digeria*

Table 1. Density and frequency % of weeds of cotton crop in district Khairpur, Sindh.

S. No.	Name of weed species	Density	Frequency %
1.	<i>Alhagi maurorum</i> Medic.	1.91	36.25
2.	<i>Amaranthus viridis</i> Linn.	4.91	56.88
3.	<i>Atylosia platycarpa</i> Benth.	2.44	30.63
4.	<i>Bergia aestivosa</i> Wight & Arn.	1.47	7.50
5.	<i>Brachiaria eruciformis</i> (J.E. Sm.) Griseb.	11.65	70.63
6.	<i>Celosia argentea</i> Linn.	3.53	29.38
7.	<i>Cenchrus ciliaris</i> Linn.	1.50	8.13
8.	<i>Cleome viscosa</i> Linn.	5.23	58.75
9.	<i>Convolvulus arvensis</i> Linn.	4.09	54.38
10.	<i>Conyza bonariensis</i> (Linn.) Cronquist.	2.24	38.13
11.	<i>Corchorus aestuans</i> Linn.	10.16	68.75
12.	<i>Corchorus tridens</i> Linn.	3.98	44.38
13.	<i>Cressa cretica</i> Linn.	5.28	58.75
14.	<i>Crotalaria medicaginea</i> var. <i>medicaginea</i> Lamk.	1.38	8.75
15.	<i>Cucumis melo</i> var. <i>agrestis</i> Naudin.	3.88	52.50
16.	<i>Cynodon dactylon</i> (Linn) Pers.	5.51	58.75
17.	<i>Cyperus rotundus</i> Linn.	4.62	58.75
18.	<i>Dactyloctenium aegyptium</i> (Linn.) Willd.	11.26	73.75
19.	<i>Desmostachya bipinnata</i> (Linn.) Stap.	2.14	35.63
20.	<i>Digeria muricata</i> (Linn.) Mart.	4.55	51.88
21.	<i>Eclipta prostrata</i> (L.) L. Mant.	3.85	57.50
22.	<i>Euphorbia serpens</i> Kunth.	13.86	67.50
23.	<i>Ipomoea aquatica</i> Forssk.	3.74	42.50
24.	<i>Launaea procumbens</i> (Roxb.)	3.16	51.25
25.	<i>Mukia maderaspatana</i> (Linn) M. J. Roem.	1.28	8.13
26.	<i>Oxystelma esculentum</i> (L.f.) R.Br.	0.56	5.63
27.	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	3.24	43.13
28.	<i>Phyla nodiflora</i> (Linn.) Greene	3.01	49.38
29.	<i>Physalis peruviana</i> Linn.	2.16	26.25
30.	<i>Pluchea lanceolata</i> (DC.) Oliv. & Hiern.	2.65	30.63
31.	<i>Sesbania bispinosa</i> (Jacq.) W. F. Wight	3.31	37.50
32.	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	7.24	61.25
33.	<i>Tephrosia villosa</i> (Linn). Pers.	1.22	8.13
34.	<i>Trianthema portulacastrum</i> Linn.	13.06	76.88
35.	<i>Tribulus terrestris</i> Linn.	3.980	53.75
36.	<i>Xanthium stromarium</i> Linn.	3.41	51.25

**Asclepiadaceae**

*Oxystelma esculentum* (L.f.) R. Br. In Mem. Wern. Soc. I: 40 (1811). Fig. 1E.

A perennial twining herb or with milky sap up to 4 m high. Stem fairly branched, slender, herbaceous, glabrous.

**Asteraceae**

1. Corolla present in the ♀ flower.

1\* Corolla absent in the ♀ flower ..... Xanthium

2. Perennial herbs or undershrubs, tomentose or glutinous ..... Pluchea

2\* Perennial herbs with yellow juice, glabrous ..... Launaea

3. Ray flowers 2- ∞- seriate, fertile, yellow ..... Conyza

3\* Ray flowers sub-2-seriate, fertile or sterile, white or yellow ..... Eclipta

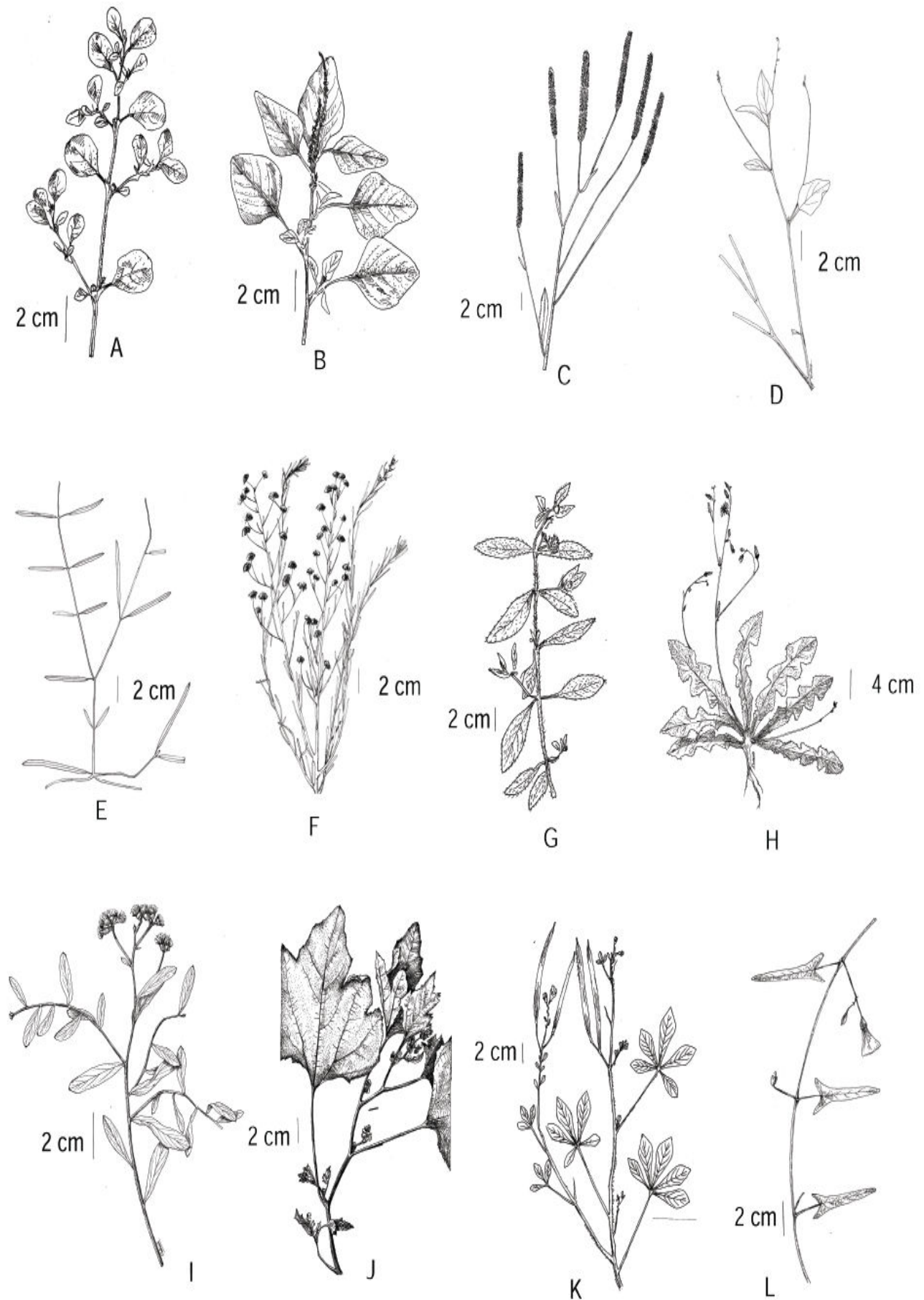


Fig. 1. A, *Trianthema portulacastrum*; B, *Amaranthus viridis*; C, *Celosia argentea*; D, *Digeria muricata*; E, *Oxystelma esculentum*; F, *Conyza bonariensis*; G, *Eclipta prostrata*; H, *Launaea procumbens*; I, *Pluchea lanceolata*; J, *Xanthium strumarium*; K, *Cleome viscosa*; L, *Convolvulus arvensis*.

*Conyza bonariensis* (L.) Cronq. Bull. Torrey Bot. Club 70: 632. 1943. Fig. 1F.

Annual herb, up to 100 cm tall, hirsute. Leaves up to ca. 6X0.3 cm, linear, acute, entire, hirsute, margin strigose, sessile.

*Eclipta prostrata* (L.) L., Mantiss. 286 (1771). Fig. 1G.

Annual herb, up to 50 cm tall, erect or prostrate, strigose, branched, sometimes rooting from the lower nodes.

*Launaea procumbens* (Roxb.) Ramayya & Rajagopal., Kew Bull. 23(3): 463 (1969). Fig. 1H.

An annual up to 80 cm tall. Stem terete, herbaceous, branches arising from the crown of the root, procumbent.

#### Convolvulaceae

1. Stamens exerted ..... Cressa
- 1\* Stamens included
2. Stigma linear or oblong ..... Convolvulus
- 2\* Stigma capitate ..... Ipomoea

*Convolvulus arvensis* L., Sp. Pl. 153(1753). Fig. 1L.

Herb, ca. 113 cm in height, twining, branched twisted.

*Cressa cretica* L., Sp. Pl. 223 (1753). Fig. 2A.

A perennial much branched herb, up to 50 cm tall. Stem woody at base, pilose.

#### Cucurbitaceae

1. Ovary ellipsoid or globose. Ovules few. Staminodes subulate.  
Seeds scorbiculate with thick raised margins ..... Mukia
- 1\* Ovary ovoid or globose. Ovules numerous. Staminodes setiform or ligulate.  
Seeds not scorbiculate, without distinct margin ..... Cucumis

*Cucumis melo* var. *agrestis* Naudin., Ann. Sc. Nat. 4, Ser. 11: 73 (1859). Fig. 2C.

Annual prostrate or climbing herb, trailing. Stem hairy or glabrous.

*Mukia maderaspatana* (L.) M. J. Roem., Syn. Monogr. 2: 47 (1846). Fig. 2D.

Annual herb, monoecious, climbing or trailing, ca. 2-3 m in height. Stem much branched, slender, angular, hispid and strigose.

#### Papilionaceae

1. Plants spiny.
- 1\* Plants not spiny.
2. Leaf simple. Pod long and narrow, dehiscent ..... Alhagi
- 2\* Leaf paripinnate. Pod linear, indehiscent ..... Sesbania
3. Seeds with distinct strophiole ..... Atylosia
- 3\* Seeds with no distinct strophiole.
4. Stamens monadelphous. Anthers dimorphic ..... Crotalaria
- 4\* Stamens monadelphous or diadelphous. Anthers uniform ..... Tephrosia

*Pluchea lanceolata* (DC.) Oliv. & Hiern, Fl. Trop. Afr., V: 329 (1877). Fig. 1I.

Erect, undershrub, up to ca. 1 m tall. Stem woody below, herbaceous above, terete, slender, branched, pubescent.

*Xanthium strumarium* L., Sp. Pl. 987 (1753); Jafri in Fl. Kar., 339 (1966). Fig. 1J.

Annual herb, erect, up to 1 m high. Stem slightly branched, strigose, stout, hard, woody at the base, herbaceous above.

#### Capparidaceae

*Cleome viscosa* L., Sp. Pl. 672. (1753). Fig. 1K.

Annual herb, up to 33 in., hispid.

*Ipomoea aquatica* Forsk., Fl. Aegypt. Arab. 44. 1775. Fig. 2B.

Creeping or floating herb. Stem hollow and rooting at lower nodes, glabrous.

#### Elatinaceae

*Bergia aestivosa* Wight and Arn. Prodr. I: 41 (1838). Fig. 2E.

A perennial ascending subshrub, up to 50 cm tall. Stem erect, woody at the base, sparsely pubescent with opposite, thin, long many branches.

#### Euphorbiaceae

*Euphorbia serpens* Kunth in Humb., Bonpl & Kunth, Nov. Gen. Sp. Pl. 2: 52 (1817). Fig. 2F.

An annual monoecious herb, up to 35 cm long, with milky latex. Stem prostrate, branched.

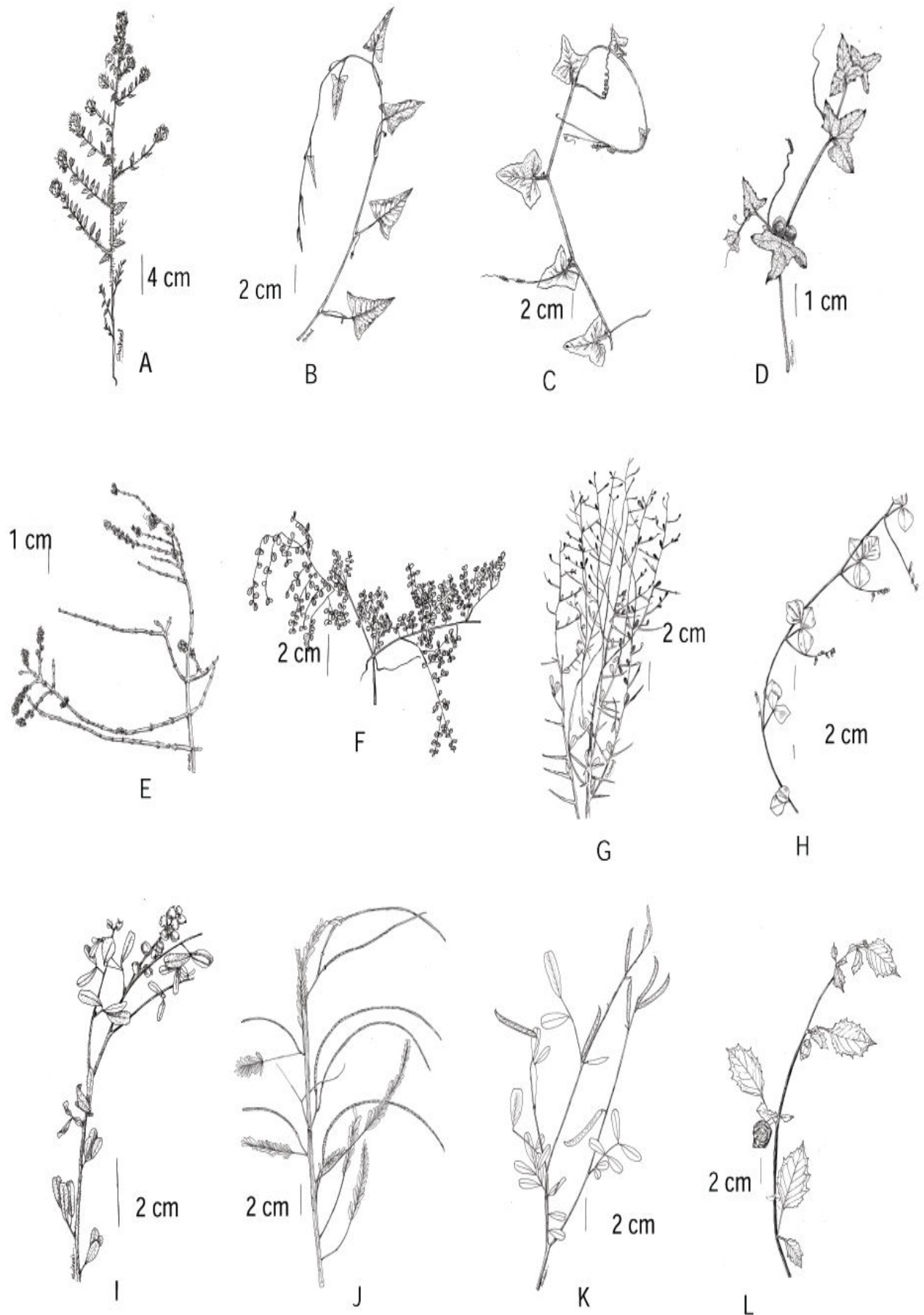


Fig. 2. A, *Cressa cretica*; B, *Ipomoea aquatica*; C, *Cucumis melo*; D, *Mukia maderaspatana*; E, *Bergia aestivosa*; F, *Euphorbia serpens*; G, *Alhagi maurorum*; H, *Atylosia platycarpa*; I, *Crotalaria medicaginea*; J, *Sesbania bispinosa*; K, *Tephrosia villosa*; L, *Physalis peruviana*.

*Alhagi maurorum* Medic. In Vorles, Churpf. Phys. Oek. Ges., 2:397 (1787). Fig. 2G.

A low perennial erect shrub, armed, up to ca. 110 cm tall, branches terete, glabrous or pubescent, spiny, spines hard and sharp, ca. 4 cm long.

*Atylosia platycarpa* Benth. In Miq. Pl. Jungh. 243. 1852. Fig. 2H.

Annual climbing herb, upto 4 m long, branches brown with tomentose hairs.

*Crotalaria medicaginea* Lamk. var. *medicaginea* Encycl. Meth. 2: 201. 1786. Fig. 2I.

Annual herb up to 40 cm tall. Stem branched.

#### Tiliaceae

1. Capsule 3-winged. Seed widely truncate, with densely reticulate surface ..... *C. aestuans*  
 1\* Capsule not winged. Seed truncate, with pitted aculeate surface ..... *C. tridens*

*Corchorus aestuans* L., Syst. Nat. ed. 10. 1:1079. 1758. Fig. 3A.

Annual herb, up to 80 cm long, stem erect, woody, terete, hispid, sparsely hairy, (unicellular hairs).

*Corchorus tridens* L., Mant. 566 (1767). Fig. 3B.

Annual herb, up to 70 cm long, stem erect, woody, terete, glabrous.

#### Verbenaceae

*Phyla nodiflora* (L.) Greene in Pittonia 4:46. 1899. Fig. 1. A1.

A perennial herb, stem rooting at nodes, prostrate, much branched, sub-quadrangular, appressedly pubescent to glabrous.

#### Poaceae

1. Ligule membranuous.  
 1\* Ligule a ring or line of hairs.  
 2. Spikes terminating with a sharp point ..... *Dactyloctenium*  
 2\* Spikes ending in a spikelet ..... *Desmostachya*  
 3. Spikelets 1-flowered. Glumes 1-nerved ..... *Cynodon*  
 3\* Spikelets 3-11 flowered. Glumes 3-7-nerved ..... *Phragmites*  
 4. Lower glume adaxial ..... *Brachiaria*  
 4\* Lower glume abaxial ..... *Setaria*  
 5. Involucre forming a shallow cup at base ..... *Cenchrus*  
 5\* Involucre not forming a shallow cup at base .....

*Brachiaria eruciformis* (J. E. Smith) Griseb. in Ledeb., Fl. Ross. 4: 469. 1853. Fig. 3F.

Annual herb, erect, up to 50 cm tall. Culms erect, geniculately ascending.

*Cenchrus ciliaris* L., Mant. 2: 302 (1771). Fig. 3G.

Perennial grass, up to 100 cm high. Culms matty at base; geniculate.

*Sesbania bispinosa* (Jacq.) W. F. Wight in U. S. Dept. Bur. Pl. Ind. Bull.no. 137: 15. 1909. Fig. 2J.

Annual, up to 2.5 m long, semi-woody, stem terete, glabrous or sparsely pubescent.

*Tephrosia villosa* (L.) Pers., Syn. Pl. 2: 329 (1807). Fig. 2K.

An annual herb, up to ca. 45 cm long. Stem terete, branches pubescent.

#### Solanaceae

*Physalis peruviana* L., Sp. Pl. ed. 2:170. 1763. Fig. 2L.

Annual herb, up to 45 cm tall, subglabrous.

#### Zygophyllaceae

*Tribulus terrestris* L., Sp. Pl. 387 (1753). Fig. 3D.

Annual hirsute, decumbent herb, up to 50 cm long. Stem woody below, herbaceous above, branched, spreading, terete, hirsute to scarios, greyish in colour; internode ca. 1-4 cm long.

#### Monocotyledons

##### Cyperaceae

*Cyperus rotundus* Linn., Sp. Pl., 45, (1753). Fig. 3E.

Perennial herb, up to 50 cm high. Stolons slender, producing tubers, ca. 20 mm in diameter, becoming black. Culms corm like at the base, 3-angled, green.

*Cynodon dactylon* (L.) Pers., Syn. Pl., 1: 85 (1805). Fig. 3H.

Perennial grass, up to 50 cm tall, extensively creeping by rhizome or by strong flat stolon and rooting at nodes. Culms slender, glabrous at nodes.

*Dactyloctenium aegyptium* (L.) P. Beauv., Ess. Agrost. Expl. 15 (1812). Fig. 3I.

An annual grass. Culms up to 60 cm tall, rooting below, geniculate, ascending, matty.

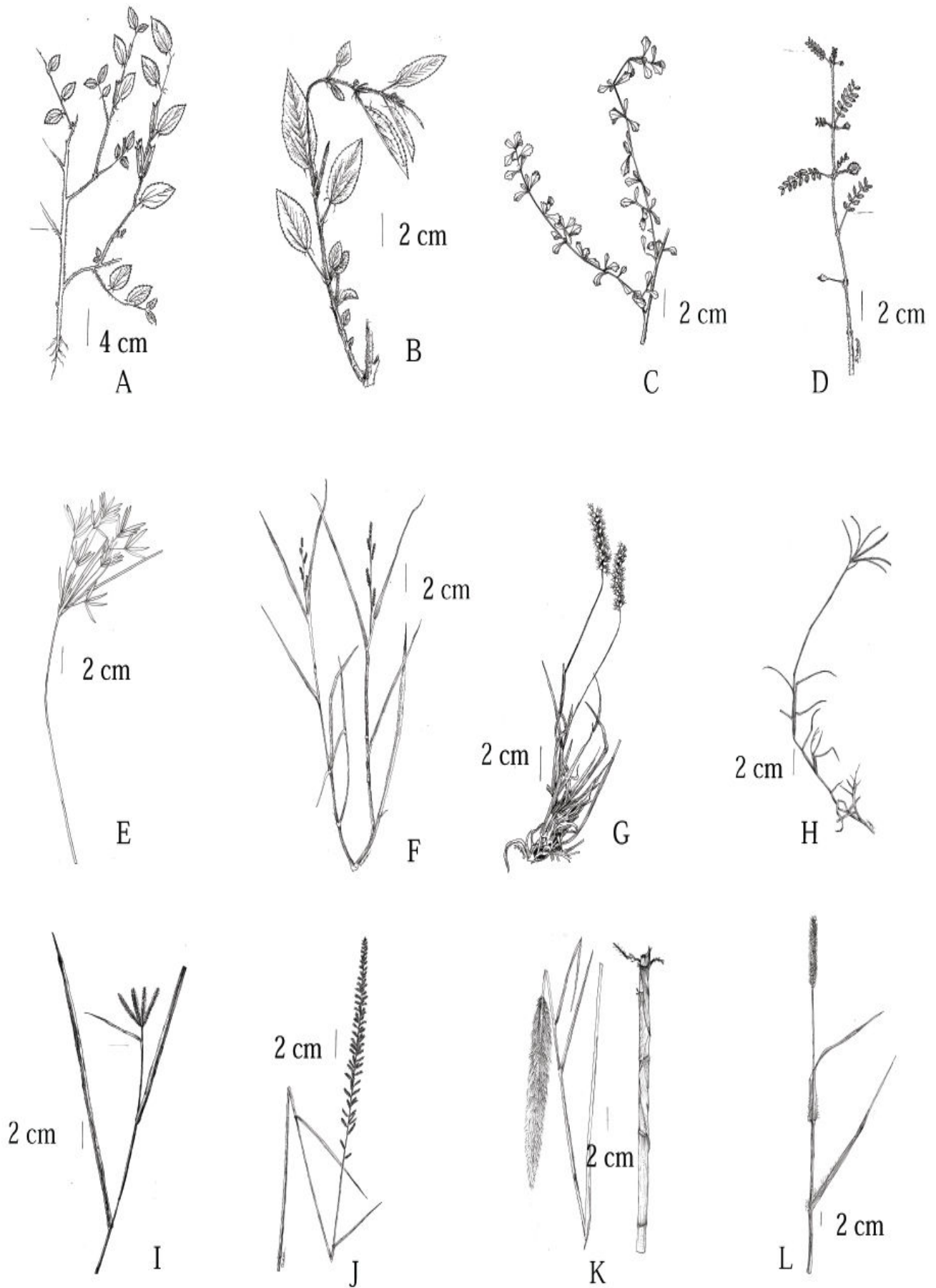


Fig. 3. A, *Corchorus aestuans*; B, *Corchorus tridens*; C, *Phyla nodiflora*; D, *Tribulus terrestris*; E, *Cyperus rotundus*; F, *Brachiaria eruciformis*; G, *Cenchrus ciliaris*; H, *Cynodon dactylon*; I, *Dactyloctenium aegyptium*; J, *Desmostachya bipinnata*; K, *Phragmites australis*; L, *Setaria pumila*.



***Desmostachya bipinnata*** (L.) Stapf in Dyer, Fl.Cap. 7:632 (1900). Fig. 3J

Rhizomatous perennial, up to 1 m high. Culms stout, nodes glabrous.

***Phragmites australis*** (Cav.) Trin. ex Steud., Nom. Bot., ed. 2, 2: 324. 1841. Fig. 2E. & Ali., Fl.Pak.,143: 25-26 (1982).

A semi-aquatic perennial, with creeping rhizomes. Culms erect, up to 1-5 m high.

***Setaria pumila*** (Poir.) Roem. & Schult., Syst. Veg. 2: 891 (1817). Fig. 3L.

A loosely tufted annual grass, up to 20 cm tall, decumbent-ascending.

#### References

- Ali, S.I. and M. Qaiser. (Eds.). 1993-2009. *Flora of Pakistan.*, No. 194-217. Islamabad, Karachi.
- Ali, S.I. and Y.J. Nasir. (Eds.). 1990-1992. *Flora of Pakistan.*, No. 191-193. Karachi and Islamabad.
- Boulos, L. 1999. *Flora of Egypt*. Vol. I. (Azollaceae-Oxalidaceae). Al Hadra Publishing, Cairo, Egypt.
- Brohi, R. and M.U. Makhdoom. 1987. Weed Control in Cotton in Sind. *Advances in Weed Science, a case of Indo-Pakistan subcontinent in Proceedings of the Pak-Indo-US Weed Control Workshop, NARC., Islamabad, Pakistan.* 419-428.
- Hussain, M., S.A. Saeed, A. Rao, A. R. Bajwa and M. Yaqub. 1987. Weed Spectrum and Competition in Cotton (*Gossypium hirsutum* L.). *Advances in Weed Science, a case of Indo-Pakistan subcontinent in Proceedings of the Pak-Indo-US Weed Control Workshop, NARC. Islamabad, Pakistan.* 437-443.
- Jafri, S.M.H. 1966. *The Flora of Karachi*. The Book Corporation, Karachi, Pakistan.
- Matthew, K.M. 1983. The Flora of the Tamilnadu Carnatic Rapinat herbarium; St. Josephs college. Vol. I-III.
- Memon, R.A., G.R. Bhatti and S. Khalid. 2001. Weeds of cotton crop in district Khairpur. *Pak. J. Bot.* 33. Special issue, 753-759.
- Memon, R.A., G.R. Bhatti, S. Khalid, R. Soomro and S. Ahmed. 2007. A survey of weeds found in cotton fields of the Khairpur district, Sindh, Pakistan. *Pak. J. Bot.*, 39(7): 2265-2274.
- Nasir, E. and S.I. Ali. (Eds.). 1970-1989. *Flora of Pakistan*, No. 1-190. Islamabad, Karachi.
- Rajbhandari, K.R. and R. Joshi. 1998. Crop weeds of Nepal. Kanchan Printing Press, Kathmandu, Nepal.
- Rajput, M.T., S.S. Tahir, B. Ahmed and M.A. Arain. 2008. Check list of weeds found in cotton crops cultivated in taluka Ubaro, district Sukkur, Pakistan. *Pak. J. Bot.*, 40(1): 65-70.
- Tunio, S. 2000. Significance of cultural weed control in cotton. *Industry & Economy Magazine*. Sep 18 - 24, 2000.
- Ullah, E., L. Ali and M.S. Cheema. 1995. Screening of Herbicides for weed control in Cotton. In: Saeed Ahmed & Muhammad Saeed (eds.) Weed management for sustainable agriculture. *Proceedings of Fourth all Pakistan Weed Science Conference*. University of Agriculture, Faisalabad, 191-201.

(Received for publication 18 September 2011)